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Archives of PHYSICAL MEDICINE *and* REHABILITATION

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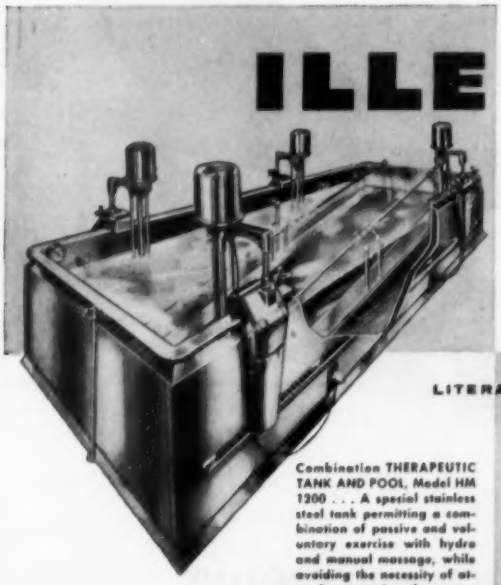

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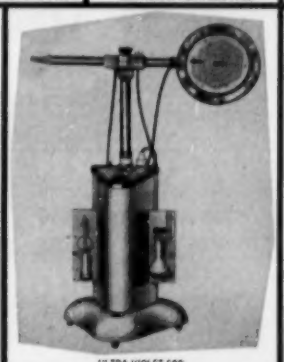

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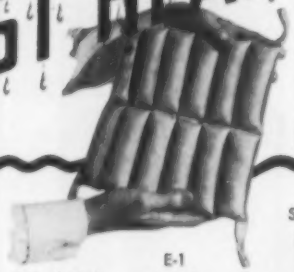

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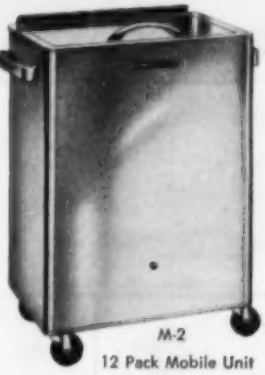

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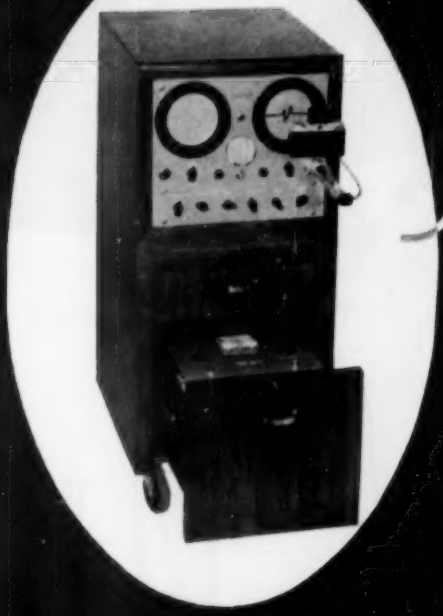

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A.B.C. Knudson, M.D., F.A.P.A., F.A.C.P.
Washington, D. C.

This is the thirty-sixth anniversary of the American Congress of Physical Medicine and Rehabilitation. Over the years a variety of intellectual and stimulating subjects has been presented to the membership on this occasion. Each retiring president has accepted that privilege and responsibility. It is with great humility that I follow their pattern and speak to you about what appears to me to be the most important concept of this Congress and of our specialty — that of total rehabilitation — and the physiatrist's responsibility in achieving this goal for his patients.

A year ago in Atlantic City this Congress elected me to its presidency with the utmost generosity and good will. This honor was deeply appreciated.

I wish to acknowledge and express both personal and official appreciation for the cooperation, support, understanding and hard work of the central office staff, all officers of the Congress and the Regional Sections, the Committees, and to the numerous members who have devoted themselves to advancing the progress of physical medicine and rehabilitation and this Congress during the past year. Again and again, very busy men and women took on one more job; the Committee Chairmen and members accepted new responsibilities; the Executive Director and Executive Secretary and their staff worked like Trojans. They deserve the highest commendation. They have put new life into the Congress and have bent every effort to making the wheels turn more smoothly.

It is with a real sense of satisfaction and pleasure that I speak to you today because our Congress and our specialty have made considerable progress during the past year. The Congress Committees have made extremely gratifying contributions this year. We have had standing committees for many years, some of which have been fairly active and have given excellent leadership in their particular fields of interest. On the other hand, some committees have not fully functioned or have served only when urgent problems were assigned to them. In addition to our progress, physiatrists have been in special demand by many groups of people and numerous communities throughout the land. This has corresponded to the constantly improving results observed in the treatment and rehabilitation of sick and disabled patients of practically every disease and disability category. There has been a much wider recognition of the proved and future potential contribution of physical medicine and rehabilitation. This has been most rewarding to those of us who have been all too keenly aware of the tragic results of totally ignoring physical medicine and rehabilitation in medical, health, federal, military, industrial or community planning; or when only a minimal role was assigned to our work. Another result of this progress has been a much wider acceptance of our auxiliary and co-professional workers — coordinators, therapists, counsellors, psychologists, social workers, and others — with the crystallization of a team relationship as the model for the practice of physical medicine and rehabilitation under the leadership of the physiatrist.

This progress will continue! For as the practice of medicine changes, so must physical medicine and rehabilitation which is an integral part of medical practice. And while it is satisfying to review some of our accomplishments, and the gains in physical medicine and rehabilitation, it is obviously more important that we should observe and critically analyze our problems, particularly those that hinder us in most effec-

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Director, Physical Medicine and Rehabilitation Service, Department of Medicine and Surgery, Veterans Administration.

tively meeting the challenges that confront us as individuals and this, our Congress. We must attempt to maintain our perspective by reminding ourselves that we are not the only ones who have problems. We live in agitated times. No student of human behavior, physical impairment, multiple disease or disability entities, and social adjustment, can be unaware of the emotional drain and frustrating influence on the personality of current international tensions which multiply the odds against a rich and rewarding life in a time of tenuous peace. There is world-wide rivalry for atomic achievement and for space supremacy. Even within the field of medicine we are aware of turmoil; disagreements between disciplines and individuals. In addition, there is the natural tendency for all of us to resist change even though we must accept the fundamental fact that we are constantly changing. Our Congress, like all expanding groups of people, has survived periods of disturbance and turmoil. A combination of factors — the prominence achieved by physical medicine and rehabilitation in the Armed Forces during World War II, then in the Veterans Administration, and more recently in other agencies of the federal government, in state and municipal governments, and in private practice; the education of the public because of the extensiveness of physical and mental disability and growing rehabilitation requirements; the increased demands on all of us for our services — have led us to be more critical of ourselves, of physical medicine and rehabilitation, and of our organization. Pertinent in this panorama is the impact of these events, facts and phenomena on the ¡American Congress of Physical Medicine' and Rehabilitation.

Today the physician continues to practice both the art and the science of medicine. This is exemplified superbly by the physiatrist who treats and follows the patient from the initial illness or disability until the patient has returned to home, society and employment. He has developed a new dimension in medical care, frequently referred to as "the third phase" which is constantly assuming a more important place in the world, due to sky-rocketing numbers of severely disabled, chronically ill, and aging patients throughout the country.

Just as a responsible medical leader in any health field, the physiatrist inevitably assumes comprehensive and serious responsibility for patient treatment, rehabilitation, and restoration to the community. This is his first and immutable responsibility. Considerable progress has been made in the wholehearted acceptance and positive discharge of this responsibility. Especially since World War II thousands of patients have been returned to their homes and jobs as productive citizens, for whom previously there would have been no outlook for the future but a hopeless one.

Nearly every family is affected by severe disability, chronic illness or the problems of old age; so naturally the physiatrist's responsibility permeates next to the patient's family, then to the community, to employers and to the general public. Throughout recent years, the conquest of many of the acute communicable diseases has focused increasing attention and concern on the ravages of severe disability and long term illness. The most neglected aspect of these conditions has been that of medically directed convalescence and rehabilitation. However, the physiatrist has corrected this to a large degree by his broad frontal attack on these problems and by his perseverance in following through with each individual patient from the moment of referral until the patient is home and, if feasible, on the job.

In our experience now for well over a decade we have shown that under the careful supervision and direction of the physiatrist, it has been possible to shorten the period of hospitalization, reduce the incidence of recurrence and return an increasing proportion of these patients to home and employment. Although the remarkable potentialities of rehabilitation instituted as early as possible for the patient has been generally recognized, we are aware that the ultimate possibilities of dynamic rehabilitation are far from being reached. This will be much further developed through re-

search, training, and further refinement of our technics.

Great advances are also possible in the preventive area of rehabilitation, maintenance therapy for the long term patient, and in the further development of complete integration and coordination of rehabilitation services under the direction of the physiatrist. With the stock-piling of disabled individuals throughout the country in spite of a tremendous increase in rehabilitation personnel and facilities over the past decade, we must unite our forces for more effective action for a larger number of the disabled.

We know that in our specialty, as in all others, the twin keys to effective progress lie in extensive, well-directed programs of research and training. Basic quantitative research in the numerous areas of our work has been steadily developing, but we must pioneer these projects at an accelerated rate in our departments in medical schools, services in hospitals and clinics, in rehabilitation centers, and other research facilities wherever they may be. Applied science soon becomes dogma unless checked and reviewed constantly by the stubborn facts of clinical testing, observation and judgment. The shortage of trained personnel in rehabilitation (physicians, coordinators, therapists and others) constitutes one of the most serious deficiencies in our field since it actually prevents the effective realization of positive results proved possible in our specialty. It is regrettable that departments of physical medicine and rehabilitation are not included in the organization of several medical schools, and therefore curricula in the several areas of this field are not available to medical students. The basic, hard core of this problem is probably one of education and public relations.

This naturally brings up the subject of efficient medical communication which we must accomplish more effectively to transmit professional knowledge regarding our specialty quickly and completely to physicians, therapists, health personnel and the public. Many times we find that it is lack of interest or concern about rehabilitation because somebody didn't get the word. The *word* is vitally essential for the progress, expansion and continuing solidarity of our specialty. As men of science, we must communicate our discoveries and observations so that others may benefit from them and that they may become a matter of record. This type of program would help to bring about a revolution in understanding and demand for rehabilitation services for the handicapped.

We immediately realize that a most important concept in our work is that of teamwork. We cannot accomplish our mission if our working relationships are not based on sound principles of teamwork with our colleagues, our therapists, all other paramedical personnel, employers and the community. In fact, the concept of medical teamwork between the physician and his patient existed in the time of Hippocrates, and we have extended this principle to include allied professions and members of the community. A physical medicine and rehabilitation service is organized and established to provide consultative and treatment services for all types of patients throughout a hospital or clinic, as well as to render total medical and rehabilitation care for severely disabled or chronically ill patients referred for admission to the ward beds of this service. The chief of service as well as his assistant physicians are physiatrists, who are specially qualified to prescribe the various types of therapy inherent in the specialty of physical medicine and rehabilitation. These treatments are administered by qualified therapists of separate allied professional therapies. The union of these formerly individual professions under the physiatrist has permitted a more effective and coordinated effort and spirit of teamwork for the benefit of the patient. The physiatrist initiates leadership of this team upon referral of the patient from another service, by examination of the patient and prescription to the various therapists, who treat the patient and report to the physiatrist either by written progress notes or by verbal reports at medical rehabilitation board meetings or evaluation conferences. He is assisted in the numerous administration and coordination details by a rehabilitation coordinator. This

plan enables the physiatrist to maintain leadership over the total team care of his patients and, at the same time, remain available primarily for medical functions of his specialty in the hospital.

Frequently, in the many articles and discussions of "teamwork" in the field of rehabilitation, we find members of allied paramedical professions questioning the position of the physician as the inherent leader of the rehabilitation team. The fundamental philosophy is, of course, that physicians — and no one else — are charged with primary responsibility for patient care. Full recognition and weight are given to the opinions, expressions and findings of each member of the team. However, authority for ultimate decisions concerning the patient is vested in the physician, for he alone is responsible for the patient's welfare.

The physician trained in this specialty to assume such responsibility is the physiatrist, and he directs the effective rehabilitation management of patients for early discharge and return to community and employment. Through the constant application of new management procedures and rehabilitation methodology we are able to increase greatly the motivation of the patient, to provide more concentrated rehabilitation therapy, and to bring about earlier discharge with considerably less possibility of relapse and readmission. Thus, by means of a broad and effective therapeutic approach, a physical medicine and rehabilitation service is inextricably involved in numerous and varied aspects of prevention, diagnosis, prognosis, treatment and rehabilitation, health maintenance, reconditioning, resocialization, prevocational development, work capacity, emotional tolerance, rehabilitation counselling, hospital industry, member employment, community retraining and adjustment, selective job placement and clinical followup. The timing and extent of the method varies, depending upon the individual patient, but the objective of rehabilitation to return the patient to community and job always remains the same.

It has often been necessary in the rapid development of our specialty to discard tradition when it has proved to be an obstacle in the road to better patient care. Further, it has frequently been essential to institute changes which sometimes are radical departures from previous methods. It is most important that we remain constantly alert to further improvements so that these advantages will continue to accrue in the future development of our specialty, but more important, in the more thorough rehabilitation of the patient himself. There are some who are resistant to change, even though continuation of the old method may be a block to professional progress; however, progressive physiatrists will support any new administrative, clinical or organizational change which proves itself more effective and efficient in accomplishing improved patient care and earlier complete rehabilitation.

It would appear reasonable to conclude that any set of circumstances which produces considerable physical and mental disability, with the usual ensuing suffering, could properly be regarded as a national health, or medical problem. Further, since in the etiology, clinical course and end-results of disability there are involved so many economic, social, psychological and physical factors, it becomes manifest that, in addition to the diagnostic, definitive and restorative areas of our work, preventive and maintenance procedures in physical medicine and rehabilitation should take some responsible and significant part in the task of solving for our nation this dilemma of the disabled. This responsibility logically concerns us because of the close relationship between the maintenance of good health, the etiological factors in severe disability, and the rehabilitation methodology involved in the restoration of the patient to his maximum potential.

The physiatrist has an administrative responsibility to management for effective and efficient rehabilitation services; to management of the hospital, the clinic, or the Board of Directors, and to those in administrative control of budget, or for appropriation of funds. We believe that we are meeting this responsibility satisfactorily, and that as our means of com-

munications improve relating our objectives and end-results, even stronger support will be forthcoming.

In fact, acceptance and support of physical medicine and rehabilitation by hospital and clinic management today is most gratifying. Hospital administrators are demanding more services, additional personnel in all categories, more advantageously located space, and modern equipment in their earnest desire to supervise up-to-date and effective hospital programs for their patients. This very strong support given our specialty by hospital administrators and managers is of the utmost vital importance to all of us. Since it has such a direct bearing on our future progress, I feel I am justified in citing an actual example at some length. Lee Cady, manager[1] of an 1100-bed general medical and surgical VA hospital, affiliated with a large medical school, in describing the autonomy of the physical medicine and rehabilitation service of his hospital, stated as follows: "We believed that it would be easier to demonstrate what physical medicine and rehabilitation could do for patients if the service had complete responsibility within its own professional sphere for the more difficult patients who were feasible for rehabilitation, and for whom definitive treatment in other specialties had been accomplished. . . . Even though the Physical Medicine and Rehabilitation Service had contacts with 40 to 50 per cent of the hospital patients, without the dignity of its own controlled beds, it seemed that it would never be recognized as more than an auxiliary, and realization of the concept of 'treatment of the whole patient' in the hospital would be held back much longer. This is one Service which should never have empty beds for there will always be another patient ready to move in, freeing a bed on another Service for a new patient. . . . The new Physical Medicine and Rehabilitation ward was opened by station administrative memorandum. This constituted 4.2 per cent of the hospital's beds. As the hospital has grown from 476 operating beds to 1,067 beds the PM&R Service has gone up to 7.2 per cent. There is today one more ward which cannot be utilized until a building program is under way, but within 12 months the PM&R Service will be augmented from 77 to 117 beds in 3 wards, or 10 per cent, which seems to be a better figure for us. The hospital will then have 1107 beds in use.

"The patient gains several advantages by being transferred to the direct control of the Physical Medicine and Rehabilitation Service when definitive treatment on other wards has been accomplished. Irrespective of the atmosphere on the ward whence he came, on the PM&R ward all patients are regarded by the doctors and nurses as having definite opportunity for improvement. The ward environment itself assumes he will regard himself as having improvement ahead, and sooner or later he will be failing his own group if he does not make every effort to attain the goals which are set for him. The patient has the opportunity to see other patients making valiant effort tpwards recovery of functions, and learning new ways to utilize the capabilities that they have remaining. Many of these advantages could not be secured without unusual effort on the other wards where the patient really does not 'belong.' They can be obtained on the rehabilitation ward more effectively. He has the advantage of being 'halfway home!' As soon as he becomes ambulatory in caring for himself to some extent, he is placed on a ward where ordinary home type beds, chairs, and the like are provided for his own use. He will be expected to adjust himself to them before he can go home. Pass privileges are usually more liberal because the doctors want to encourage the patients to resume outside contacts, or to visit their homes so that the patients and their relatives will become conditioned to their eventual return home.

"The doctors, nurses and aides on the PM&R wards are a better integrated rehabilitation therapy team. They are oriented to a dynamic and a positive approach to the patient with chronic disabilities, and are tactfully stimulative rather than just sympathetic or reassuring in their care. Moreover, they are trained in rehabilitation technics better than the personnel of the acute wards. They are more uniformly equipped for

handling skin lesions, decubiti, braces, catheters, Foster frames, respirators, rocking beds, special wheelchairs, etc. They do these things with more casualness and purpose.

"The hospital has an advantage in having rehabilitation wards since they can be maintained more economically than acute wards. The PM&R ambulatory ward is ideal for the ambulatory tuberculous patient who is sputum negative, needs a mental change, and fairly strict supervision over his activities. We call this our 'side door' to our Tuberculosis Service, and of course we are freeing a great many tuberculosis beds for acutely ill patients. The PM&R wards accomplish the same thing for all the other Services of the hospital."

Cady continued, "The value of the autonomous beds in the Physical Medicine and Rehabilitation Service is immediately obvious while contemplating the residency training program in this specialty. The resident can take complete charge of his patients under the supervision of a board certified physiatrist and follow them through the entire rehabilitation program, without the division of responsibility with residents in other fields. The Chief, Physical Medicine and Rehabilitation Service can and does encourage the resident on the wards from which the patient was transferred to follow the rehabilitation progress of the patient.

"On the PM&R bed service there is a constant effort for devising new equipment and improving technics. The doctors there are just as interested in tidal drainage equipment, or that the patient's bladder may be successfully conditioned, as is the urologist or neurologist. The proper use of prostheses, in spite of motivation difficulties, is of more direct interest, perhaps, to the physiatrist than is the case of the specialist in other fields. The patient does not have occasion to suffer in his rehabilitative process because the other specialist is too busy to take care of him. The physiatrist has no other job than to concentrate on rehabilitation and bring it along as fast as the patient can make progress. Furthermore, he may be more adept at detecting the patient's negative rationalizations."

Cady concluded, "The Physical Medicine and Rehabilitation Service is no different in its professional objectives than any other Service; and, if it is a teaching and research service, the care of the patient is better. The opportunities for research and teaching do not suffer from administrative or other impediments to the same extent on PM&R wards as when the patients are dispersed throughout the hospital and there is a division of responsibility between residents."

In describing the integration of hospital and community rehabilitation resources, Cady further confirmed his support of this service, stating, "In the VA hospitals we have an excellent opportunity, although this has not yet been fully exploited, to bring the patient from his definitive medical care to completely under the jurisdiction of the physiatrist. This has been done at this hospital by administratively setting up a Physical Medicine and Rehabilitation Service which has beds allocated to it. We have been working in this manner more than five years but we never seem to get a sufficient number of beds for the prompt handling of all the patients from other services at the time when definitive care is ready to terminate. This integration of its internal rehabilitation resources would seem to require not less than 10 per cent of beds in a general hospital with a good interservice working relationship, and, with an adequate physiatric staffing, the service might very well take 20 per cent of a general hospital's beds. The specialist can follow the rehabilitation progress of his patient on the Physical Medicine and Rehabilitation Service as a consultant or in a sort of outpatient arrangement from his own position within the hospital. He can see the results of his treatment and how the extension of his specialistic efforts has been carried on by the physiatrist and his assistants."

Timm,[2] manager of a large psychiatric VA hospital of nearly 2,000 beds, in speaking of the role of physical medicine and rehabilitation in a mental hospital, stated, "In the broadest sense, the

PM&R program is usually the largest treatment program in the psychiatric hospital. We have learned that of all our therapy agencies, the PM&R Service is best equipped to satisfy the requirements. We are convinced that, provided certain conditions are met, the PM&R approach to chronic mental illness is the one most likely to benefit the greatest number of patients. To summarize, it may be said that, insofar as the psychiatric hospital is concerned, the role of physical medicine and rehabilitation is to provide all of those services which are ordinarily provided in the general hospitals for the improvement of function, for the bringing about of fuller and more complete recovery, but also uniquely in the NP hospital, its role is to provide the main therapeutic approach to chronic mental illness, and that, properly oriented with a properly trained staff, the problems of chronic illness can be attacked rationally with the resources that we now have."

Thomas,[3] manager of a 500-bed VA tuberculosis hospital, affiliated with a state university medical school, observed, "The results of a successful rehabilitation program can be measured with factual evidence and even with statistical data. Our primary concern is the patient. Each patient presents some degree of challenge to the Medical Rehabilitation Board, the PM&R Service and collaborating services. The PM&R Service has been given the major responsibility for guiding the attainment of the vocational and post-hospital goal. Does a PM&R program have a place in a tuberculosis hospital? My answer is an unequivocal Yes. There must be a medically sponsored, coordinated and controlled program designed to help the patient to adjust himself to the limitations imposed by his disease."

This, then, is the ultimate in management support; and when we attain the confidence such as just expressed, our responsibility increases further. Let us, therefore, recognize the obligation we are under to our fellowman for total rehabilitation, and to our professional colleagues for the teamwork necessary to effect it. Ours is the duty and the privilege of bringing to every patient referred to us, the advantages, the significance and the results of our dynamic medical discipline.

Krusen[4] stated, "It is obvious that the scope of our medical discipline is enormous and that the future of our specialty is promising. Our recent progress has been truly phenomenal." And Rusk[5] emphasized, "With the growing increase in chronic disability resulting primarily from an aging population, medical care cannot be considered complete until the patient has been trained to live and to work with what he has left. Rehabilitation is a medical responsibility."

President Eisenhower more recently observed, "I share with thousands of other Americans a deep interest in the future of the handicapped people in this country. Our Nation can ill afford to lose the productive power and the talents of those who are idle today because they are disabled. We need them as active, productive citizens."

Certainly then, to attain our objective of the most complete and effective rehabilitation management of the patient, we must all be aggressively rehabilitation minded. In this age of atomic power, satellite planning and rivalry for outer space, our *Formula* for *Rehabilitation* of the *Disabled* stands out as a great monitor of medical progress, human engineering and international understanding in a world of increasing tensions. Ours is a force which has great momentum, unequalled power for good, and an underlying energy which has an almost unpredictable influence on our future.

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IMPORTANT ANNOUNCEMENT

The Editorial Board of the *ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION* has established a special subscription rate of $5.00 per year to be granted to bonafide residents in physical medicine and other specialties in the United States, its territorial possessions, Mexico, Canada, United Kingdom and Europe. The following rules apply:

1. The subscription may be entered for a period not to exceed three years.
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The Seventh John Stanley Coulter Memorial Lecture: Physical Measures in the Postoperative Care of the Surgical Patient

Fred B. Moor, M.D.
Los Angeles

Many advances in medicine and surgery were made under the stress and urgency of World War II. Important among these was the early ambulation of the postsurgical patient. This was precipitated by two factors: a shortage of hospital beds and the need for maximum manpower in the prosecution of the war effort. What started as a wartime necessity has since developed into an important advance in postoperative care.

The term "ambulation" in connection with postsurgical care is unfortunate because it conveys the idea that no activity is indicated until the patient walks. This may be true if he walks early enough, but usually he does not. A more inclusive term is "mobilization" which encompasses any activity whether it be exercise in or out of bed. This is important, since experience has shown that the earlier activity is started after surgery, the more effective it is in the prevention of certain serious complications.

Literature Review

Prolonged bed rest has certain deleterious effects which were enumerated by Keys[1] as loss of endurance and postural coordination, reduction in circulatory capacity and efficiency, decrease in circulating blood volume, decrease in cardiac dimensions associated with tachycardia, constipation, and negative balance of nitrogen, potassium and calcium. Dock[2] called attention to the further fact that long periods of bed rest, often reinforced by sedatives, markedly predispose to phlebothrombosis and pulmonary embolism.

The concept of early ambulation of postsurgical patients is not new. It was advocated by Ries[3] in 1899, but was too great a departure from the standard procedure of his time to endure. It was again reported by Boldt[4] in 1907, by Claremont[5] in 1922, and by Robertson[6] in 1927. Early ambulation was employed by European surgeons for many years before it came into general use in this country.

During World War II reports on the early ambulation of postsurgical patients again appeared in the surgical literature and have continued until the present. Early ambulation is apparently here to stay because of its demonstrated benefits. Surgeons generally agree that it lessens the incidence of atelectasis wound infections, and decubitus ulcers. It decreases postoperative fever, the need for sedatives and analgesics, and the use of the catheter. There is improved gastrointestinal function with decreased abdominal distention and constipation. There is disagreement, however, concerning its effect upon the incidence of thrombosis and pulmonary embolism.

Leithauser and co-worker[7, 8] reported in 1951 that they had observed no instances of postoperative pulmonary embolism in a series of 3,371 major surgical cases with early ambulation. Eight months later, however, they reported two cases of pulmonary embolism (0.063 per cent) with one death (0.032 per cent). In the fatal case, the patient was confined to bed by her husband after she returned home.

Shapiro[9] observed that early ambulation reduces the incidence of phlebothrombosis and pulmonary embolism more than 50 per cent. Trice[10] in a series of 562 cases in which early ambulation was employed observed no phlebothrombosis in any case. Palumbo

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and co-workers[11] in a controlled study of early ambulation, with 1,735 cases in the treated group and with 1,220 cases in the control group, encountered 6 cases of thrombophlebitis in the ambulated group and 9 in the control group. There were 2 cases of pulmonary embolism in the treated group and 4 in the control group. Hunter and his group,[12] on the basis of postmortem findings in an exercised group and a nonexercised control group, found 17.9 per cent of the exercised group and 53.7 per cent of the nonexercised group to have thrombosis of the leg veins.

On the negative side of the controversy, Thompson's group[13] found early ambulation to make no difference in the frequency of phlebothrombosis and pulmonary embolism. Powers,[14] in a series of 467 hernioplasties, reported that early ambulation did not alter the incidence of thrombosis of the deep veins of the leg nor the occurrence of small, nonfatal pulmonary emboli. Judd[15] observed that "the one great disappointment appears to be the failure of this method of treatment to reduce the incidence of thrombosis and embolism." Wigginton and fellow workers[16] reported an incidence of 40 cases (0.43 per cent) of phlebothrombosis, thrombophlebitis, and pulmonary embolism in 9,230 surgical procedures at the Vicksburg Hospital in spite of the fact that early ambulation was employed. There were 17 cases of pulmonary embolism with 7 deaths. Vaughn and co-workers,[17] in a series of 135 patients ambulated early and 135 others ambulated late, observed 2 cases of thrombophlebitis, 2 of phlebothrombosis, and 3 of pulmonary embolism in the patients ambulated early, and only one case of thrombophlebitis and one of pulmonary embolism in the patients ambulated late.

As these various reports on early ambulation are compared, it becomes apparent that the incidence of venous thrombosis and pulmonary embolism depends upon the individual surgeon's concept of what constitutes early ambulation of the postsurgical patient. To Leithauser[7] and his followers, early ambulation means getting the patient out of bed for brief periods immediately after recovery from anesthesia. With this procedure the incidence of thrombosis and embolism is almost nil. On the other hand, some surgeons start ambulating from the first to the third postoperative day and report that early ambulation has no effect upon the incidence of thrombosis and embolism. It is apparent that if early ambulation is expected to decrease the incidence of these serious complications, it must be started on the day of the operation.

Virchow[18] in 1846 first postulated that blood clots found in the pulmonary arteries at postmortem examination originated in the lower extremities or the pelvis. At the time his idea met with bitter opposition.

McCartney,[19] in a study of 4,070 necropsies on surgical patients at the University of Minnesota, found the incidence of venous thrombosis and pulmonary embolism to be 11.5 per cent and that of fatal pulmonary embolism to be 5.3 per cent.

Hunter and his group,[20] in a study of 351 necropsies on medical and surgical patients, found the incidence of pulmonary embolism in the entire group to be 14.55 per cent and of fatal pulmonary embolism, 3.13 per cent. Among the 42 surgical patients in the group, 46.9 per cent had thrombosis of the leg veins and 5 of these died of pulmonary embolism.

Neumann[21] in 1938, in a postmortem study of the veins of the lower extremities in 100 subjects showing thrombosis, found the plantar veins involved in 71 per cent, the veins of the internal malleolar region in 17 per cent, the leg veins in 87 per cent, and the thigh veins in 22 per cent. In no instance was thrombosis limited to the thigh. The evidence is then that venous thrombosis, in the great majority of instances, begins in the vessels of the feet and legs. In the leg, Hunter's group[20] found the soleus involved twice as frequently as the gastrocnemius.

The foregoing postmortem findings vindicate the rationale of recent advances in the prophylaxis of thrombosis and embolism which I shall now describe.

In 1948, Tichy and Shaw[22] reported that intermittent faradic stimulation of the dog's leg muscles increased the rate of return venous blood flow 80 to 100 per cent. In the same year Apperly and Cary[23] demonstrated the prevention of experimental gravity shock and venous stasis in susceptible human subjects by intermittent sinusoidal stimulation of the calf muscles.

In the following year, as a logical outgrowth of the studies just mentioned, Tichy and Zankel[24] presented a series of 639 postsurgical cases in which intermittent sinusoidal stimulation of the calf muscles was applied to patients immediately after leaving the operating room. There were only 2 cases of thrombosis and no cases of pulmonary embolism. There was no control series, but the authors estimated that at the usual rate of incidence 20 cases of thrombosis could have been expected.

Martella and co-workers[25] recently employed immediate postsurgical sinusoidal stimulation of the calf muscles in 350 cases following chest surgery. There were no instances of thrombosis or pulmonary embolism among their patients.

At the White Memorial Hospital in Los Angeles during the 15-year period from 1942 to 1956 inclusive, 36,471 major surgical operations were performed (see table 1). During this same period there were 40 cases of pulmonary embolism with 22 deaths. This is an incidence of 0.11 per cent and a death rate of 0.06 per cent. When this is broken down into 5-year periods, we find that during the first 5-year period there were 10,677 major operations with 16 cases of pulmonary embolism and 9 deaths; during the second 5-year period, 11,121 operations with 21 cases of embolism and 10 deaths; and during the third period, 14,673 operations with 3 cases of embolism and 3 deaths. Earlier ambulation is doubtless the reason for the fewer embolisms in the last period.

Table 1: Incidence of Pulmonary Embolism at the White Memorial Hospital for the 15-Year Period, 1942-56

Period	Major Operations	Pulmonary Embolism	Deaths
1942-46	10,677	16 (0.15%)	9 (0.084%)
1947-51	11,121	21 (0.19%)	10 (0.09%)
1952-56	14,763	3 (0.02%)	3 (0.02%)
1942-56	36,471	40 (0.11%)	22 (0.06%)

Controlled Clinical Study

During the latter part of the year 1955 and the early part of 1956, a controlled study on the prevention of postsurgical phlebothrombosis and pulmonary embolism was carried out at the White Memorial Hospital with the cooperation of the surgical service. There were 100 treated patients and 100 controls. All patients had undergone major surgical operations. Patients and controls were paired as to age, sex, and nature of surgical procedure. The controls were not concurrent cases but were drawn at random from our record files of the previous three years.

The postoperative procedure in the treated patients was as follows: All patients were started on treatment within one hour after leaving the operating table. The calf muscles were stimulated bilaterally with a surged rapid sine wave,* 6 seconds on, 7 seconds off, for 10 minutes every 30 to 60 minutes until the patient had recovered sufficiently from the anesthetic to do voluntary exercises of his feet and legs.

As soon as the patients were sufficiently recovered, the following simple exercises were carried out under supervision once each hour while awake until ambulation was instituted: (1) Forcible plantar and dorsiflexion of the feet with flexion and extension of the toes eight times, and (2) at least six deep breaths.

Records were kept of abdominal distention, wound infections, phlebothrombosis or thrombophlebitis, pulmonary embolism, number of days from operation to ambulation, and the number of days from operation to discharge from the hospital. After the patient left the hospital, a period of at least two months was allowed to elapse before a final evaluation was done for postoperative complications.

Effects of Sinusoidal Stimulation, Foot and Leg Exercises, and Early Ambulation in Postsurgical Convalescence

The results of the postoperative program of sinusoidal stimulation of the

*Treatment was given with the Myosynchron furnished through the courtesy of the Birtcher Corporation of Los Angeles.

calf muscles followed by supervised bed exercises and early ambulation are shown in table 2. Abdominal distention occurred only half as frequently among the treated patients as among the control group and was less severe. There were no cases of thrombosis or embolism in the treated group but in the control group there were three cases of thrombosis and one possible nonfatal case of pulmonary embolism. There were no wound infections among the treated patients but there were two among the control group. The treated patients were discharged from the hospital 1.6 days earlier on the average than the control patients.

Table 2: Results of Study on Postsurgical Phlebothrombosis and Pulmonary Embolism

	Treated Patients	Controls
Number of patients with abdominal distention	14	28
Average duration of abdominal distention, days	2.14	2.21
Number of cases of phlebothrombosis or thrombophlebitis	0	3
Number of cases of pulmonary embolism	0	1 (possible)
Number of wound infections	0	2
Average number of days from operation to ambulation	1.8	1.9
Average number of days from operation to discharge	7.0	8.6

Discussion

The importance of immediate postsurgical mobilization cannot be overemphasized. It is likely that during the operative or early postoperative period venous thrombosis starts in the veins of the foot and leg. The available evidence indicates that ambulation on the first, second, or third postoperative day is not early enough. Immediate postoperative electrical stimulation of the calf muscles plus foot and leg exercises and deep breathing as soon as voluntary motion is possible is considerably less strenuous than the Leithauser technic of ambulation on the day of the operation. Nevertheless, early ambulation is also important and should most certainly be started on the first postoperative day unless there is a serious contraindication such as shock, hemorrhage, peritonitis, cardiac failure, or imminent death. It is possible to prevent these residual vascular complications, which early ambulation, as at present usually practiced, has failed to eliminate.

Summary

Prolonged bed rest has certain deleterious effects, the most dangerous of which are venous thrombosis and pulmonary embolism. Early ambulation executed according to Leithauser's technic is almost a complete preventative of thrombosis and embolism, but early ambulation as currently practiced is not entirely effective. Immediate mobilization of the postsurgical patient by means of electrical stimulation of the calf muscles followed by bed exercises and then by ambulation on the first postoperative day is less strenuous for the patient than immediate ambulation and is effective in preventing thrombosis and embolism. In a controlled series of 100 major postoperative surgical cases in which sinusoidal stimulation of the calf muscles was followed by bed exercises and early ambulation, there were no instances of thrombosis or embolism.

Acknowledgment is made of the valuable assistance of Ivan Deacon, R.P.T. (Australia) in the collection of data for this paper.

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IMPORTANT ANNOUNCEMENT

American Board of Physical Medicine and Rehabilitation

The next examinations for the American Board of Physical Medicine and Rehabilitation will be held in Peoria, Ill., June 20 and 21, 1958. The final date for filing applications is March 1, 1958. Applications for eligibility to the examinations should be mailed to the Secretary, Dr. Earl C. Elkins, 200 First St., S. W., Rochester, Minn.

Disturbance of Perception of Verticality in Patients with Hemiplegia: Second Report

Jan H. Bruell, Ph.D.
Mieczyslaw Peszczynski, M.D.
and
David Volk, M.D.
Cleveland

Every neurologist expects, and on closer examination finds, evidence of sensory loss in hemiplegic patients. We have dealt extensively with one particular sensory deficit in these patients. In a previous publication[1] we reported that hemiplegics err considerably when confronted with the task of adjusting a luminous rod to verticality in a dark room. Some patients see the test rod as vertical when it deviates as much as 25 degrees from objective verticality. In this paper we will present further evidence for spatial disorientation in hemiplegics. In addition we will discuss certain indications of a relation between spatial disorientation and ambulation in hemiplegic patients.

Procedure

Testing was carried out in a dark room. The apparatus (fig. 1) consisted of a frame, 110 x 110 cm., and a rod, 100 cm. long, which was placed within the frame. The midpoint of the frame and rod coincided. The frame and rod could be rotated independently of each other around this common midpoint. The frame and rod were painted with luminous paint and were the only visible objects in the room.

The patient was seated in a wheelchair at a distance of 200 cm. from the apparatus. He had the task of adjusting the luminous rod to what appeared to him to be vertical. He performed these adjustments by instructing the experimenter as to the direction in which the rod should be turned. When the patient was satisfied that the rod was vertical, deviations of adjustments from objective verticality were measured.

Adjustments of the test rod were performed in full view of the luminous frame which remained stationary while the rod was turned. The position of this stationary background figure constituted the main variable of the experiment. Three frame positions were used. In one condition the frame was tilted 30 degrees counterclockwise (L); in a second condition, the frame was tilted 30 degrees clockwise (R); in a third condition, the square frame was turned until one of its diagonals was vertical. In this latter condition, the background figure had the appearance of a diamond (D).

At the beginning of each trial, in addition to tilting the frame, the experimenter tilted the test rod either 30 degrees counterclockwise (l) or 30 degrees clockwise (r). The combination of the three conditions of frame tilt (L, R, D) with the two starting positions of the test rod (l, r) resulted in six experimental situations (Ll, Lr, Rl, Rr, Dl, Dr). Two trials, a test, and a retest trial were administered for each experimental situation. Thus, in a given test session, the patient had to adjust the test rod twelve times.

At the beginning of each testing session, before turning off the lights, the experimenter made sure the patient knew what was meant by verticality ("straight up and down"). He tested the patient's ability to indicate verbally in which direction he, the patient, wanted the experimenter to turn the test rod. Further, the experimenter demonstrated to the patient that the position of the frame would be changed during the experiment, and he stressed that the frame was put there in order to confuse the patient. The experimenter made it quite

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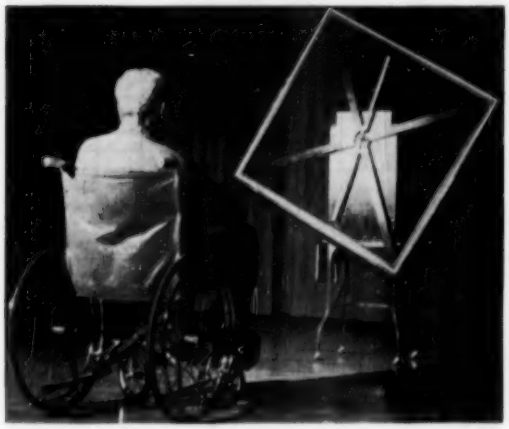


Fig. 1

clear to the patient that he should pay no attention to the frame while adjusting the test rod to verticality.

Ten patients with hemiplegia on the left side and ten with hemiplegia on the right were selected from a population of about 100 hemiplegic patients hospitalized at Highland View Hospital at the time of testing. The only criteria for selection were the ability of the patient to sit up and talk; severely aphasic patients were not tested. In addition, patients with field defects, and patients whose corrected visual acuity in both eyes was less than 20/70 were excluded. The mean age of 19 of the patients was 62.0 years (S.D. 8.5 years). One patient was 33 years old.

Twenty normal control subjects were tested. Their mean age was 63.4 years (S.D. 8.2 years).

Results

Each patient made four adjustments per frame position (e.g., Ll-test, Ll-retest, Lr-test, and Lr-retest). All correlations between test and retest trials were significant (mean $r = 0.90$), indicating the reliability of the measures employed. There was no statistically significant difference between test and retest trials, nor did "l" adjustments differ from "r" adjustments. Thus the four measures obtained for a given frame position were combined for further analysis. Patients with hemiplegia on the left side did not differ in their performance from those with hemiplegia on the right. The following statements, therefore, refer to both diagnostic subgroups.

The mean error score, that is the average amount the adjustments of an individual deviated from objective vertical, was computed for each patient and each control subject. These error scores are tabulated in figure 2. The patients are seen to be divided into two distinct groups separated by a wide gap. Nine of the patients do not differ in their performance from the control subjects. Their mean error does not exceed 8 degrees. The remaining eleven patients show errors in excess of 22 degrees. Analysis of the data for individual patients showed a high degree of consistency of performance. Individual patients obtained either high or low deviation scores independent of frame position (mean $r = 0.88$). The distribution of scores shown in figure 2 is clearly bimodal, suggesting a basic difference between the low- and the high-scoring patients.

Discussion

In dark-room experiments, normal subjects tend to be extremely accurate when confronted with the task of adjusting a luminous rod to verticality.[3] We look at an object and judge its position

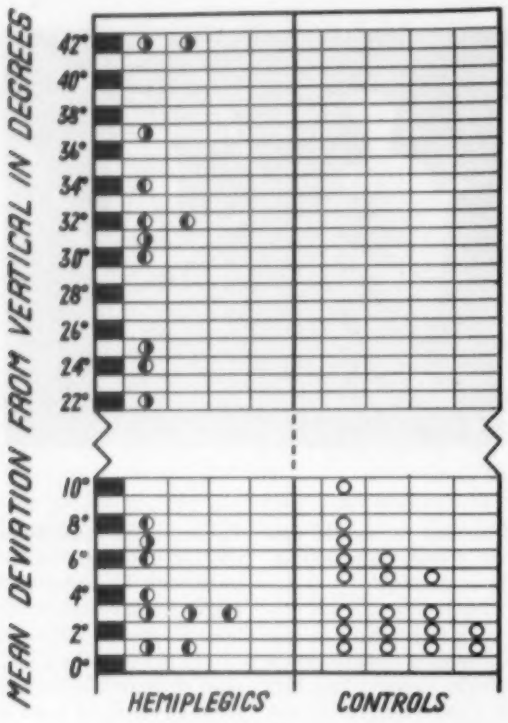


Fig. 2

with great subjective certainty and, as experiments show, with great objective accuracy. Our subjective certainty remeans unimpaired, but our objective accuracy suffers greatly when the same task has to be carried out against a background of tilted objects. When viewed against such a background, an objectively vertical rod appears somewhat tilted. We become victims of an illusion.[3]

The illusion occurs when the axis of symmetry of the background figure is tilted, and it is absent with background figures whose axis of symmetry is vertical. In conditions L and R of the present experiment, the axis of symmetry of the background square is tilted; in condition D, the axis of symmetry of the diamond is vertical. Correspondingly, the control subjects and the low-scoring patients make greater errors in conditions L and R than in condition D.

The performance of the high-scoring patients differs markedly from the performance of both the control subjects and the low-scoring patients. The high-error scores of these patients cannot be accounted for by an illusory displacement of the test rod induced by the tilted background. Such an explanation would be contradicted by the observation that these patients make significantly greater errors in the presence of a background that is not tilted (D) than in the presence of tilted background objects (L and R).

Only one explanation appears to exist for the poor performance of the high-scoring patients. In the dark-room these patients become totally disoriented. They do not realize that the frame has been tilted by the experimenter. They perceive the frame as upright and they turn the test rod until it is at right angles with the "top side" of the "upright" square (fig. 3). This explains why, in condition L, adjustments clustered around a position 30 degrees counterclockwise, and why, in condition R, adjustments fell around a point 30 degrees clockwise. It also explains why, in these patients, error scores were significantly greater for con-

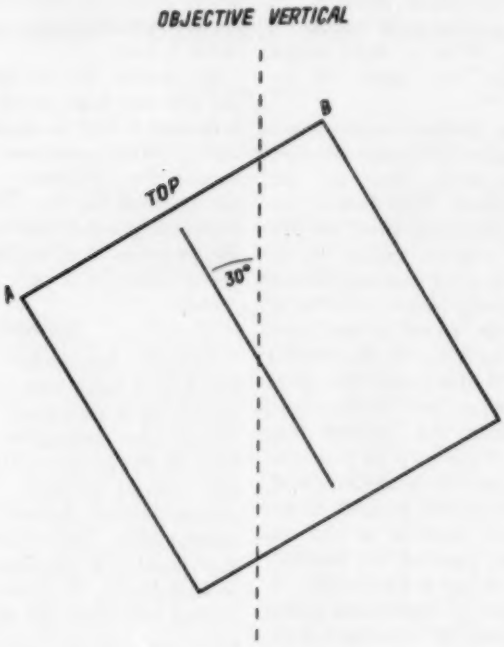
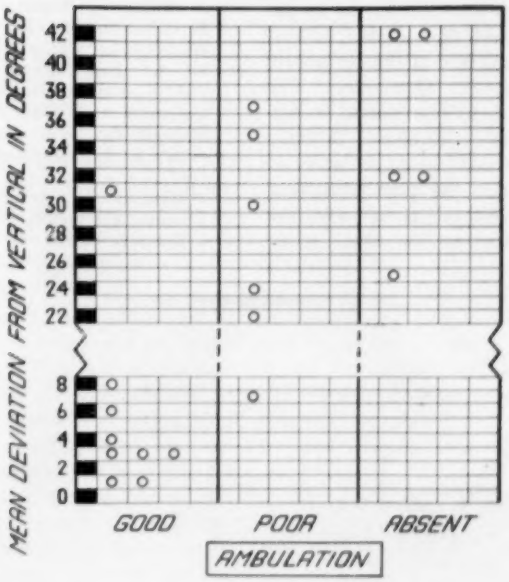

OBJECTIVE VERTICAL
TOP
B
A
30°

Fig. 3


MEAN DEVIATION FROM VERTICAL IN DEGREES
42
40
38
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2
0
GOOD
POOR
ABSENT
AMBULATION

Fig. 4

dition D than for conditions L and R. In condition D the rod had to be turned 45 degrees in order to be at right angles with one of the "top sides" of the diamond.

The preceding analysis suggests that there is a qualitative difference between the performance of the low- and the high-scoring patients. The former are victims of an illusion, the latter are disoriented. The question arises as to whether the low-scoring patients differed from the high-scoring patients outside of the dark-room. An answer to this question is suggested by figure 4. We divided the 20 patients of this study into three groups: good walkers, poor walkers, and wheelchair patients. A patient was placed in the first group if he was able to walk long distances at moderate speed, if he moved freely on the grounds of the hospital, if he was observed to visit, on his own, different parts of the hospital, and if he did not use a wheelchair. A patient was placed in the second group if, for the most part, his walking was restricted to the immediate ward environment, if he moved very slowly, if he used cane and railings wherever possible, if he preferred to use a wheelchair and, in general, led a sedentary life. Figure 4 shows that only one of the nine patients in the first group was disoriented in the dark-room test and that all five wheelchair patients, and five of the six poorly walking patients were disoriented. The distribution of scores represented in figure 4 is statistically significant. A clinician, however, would like to see a better separation between the poorly walking patients in the second group and the wheelchair patients in the third group before he would consider the space perceptual test discussed here as being of value to him.

We realize the clinical limitations of our test and hope to be able to modify it in such a way as to make it clinically useful. Many questions have to be answered first. Foremost among them is the question of why the demonstrated relationship should exist at all. What are the processes that relate ambulation to performance on a space perceptual task?

Summary

Twenty hemiplegic patients were tested on a space perceptual task administered in a dark-room and which involved the perception of verticality. Nine of the patients performed like normal control subjects. The remaining eleven patients showed signs of spatial disorientation. Performance on the space perceptual task was found to be related to ambulation. In general, patients who walked well were not disoriented in the dark-room, while all wheelchair patients tested in this study were disoriented.

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An Improved Prosthesis for Hemipelvectomy

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Hemipelvectomy, or interinnominoabdominal amputation, is an extensive surgical operation, usually for malignancy involving the upper femur, hip joint, pelvis, and the surrounding soft tissue. This operation was first performed by Billroth in 1891;[1] the patient survived only a few hours. Gordon-Taylor,[2] in a review of 50 cases of hemipelvectomy performed at the Middlesex Hospital in England between the years 1922 and 1950, found the operative mortality before 1940 was 36 per cent and after 1940 was 18 per cent. Pack[3] reported 8 cases of hemipelvectomy in 1947; there was no immediate operative mortality. King and Steelquist[4] reported 6 cases in 1943; there was one operative death. Thus the high operative mortality has been markedly reduced and the operation is being performed more frequently, with the result that the problem today is one of rehabilitation, particularly the development of a suitable, comfortable and functional prosthesis. Morton[5] in 1942 wrote: "No prosthesis can be fitted easily in this stump. The patients quickly learn to use crutches, and get around well by this means. They learn to adapt themselves to sitting on the involved side. The younger patients, according to reports, adjust themselves more quickly and successfully." Even as recently as 1947, reports in the literature complain of the lack of a good prosthesis.

The early prosthesis consisted of a large leather bucket to support the lower abdominal tissue.[6] Figure 1 shows this type of prosthesis. A wide abdominal belt was used to fasten the bucket, and a shoulder strap was installed in some for additional support. The difficulty with this prosthesis was excessive telescoping of the soft tissue into the bucket, in some cases, allowing an excursion of four inches or more. Due to lack of support, excessive pressure was exerted in the groin and perineum.

Our experience in the use of molded plastic in prosthetic devices led to the exploration of the use of this material in a hemipelvectomy prosthesis. Attempts were made to combat the disadvantages of the early leather prostheses. Plastic molded buckets were made to fit the stump, which consists essentially of soft tissue. In addition, a bridge extending from the lower part of the bucket across the midline to engage the remaining ischial tuberosity, or heavy muscle groups, took over a portion of the weight bearing. The bucket extended above the costal margin, and a wide pelvic belt was well fitted over the crest of the remaining ilium. Repeated adjustment was often necessary to relieve pressure of the bucket upon the ribs and the remaining sacrum. A regular prosthesis was attached to the bucket by a regular hip joint; roller castings were added to the upper portion of the thigh piece to give additional stability to the hip attachment. Patients wearing this type of prosthesis felt considerable increase in their sense of balance, thus improving gait pattern. The telescopic movements were largely eliminated. Figures 2 and 3 show this type of prosthesis.

When the prosthesis was completed, the patient was given a course in gait training. During the first week, the patient was instructed in putting on and removing the prosthesis, in standing-balancing exercises, gait training with parallel bars, crutch walking, and in walking with a cane. In the second week, the patient was allowed to take the prosthesis home and continue to practice at home, but still came in regularly for training. An average pa-

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Director, Prosthetic and Orthopedic Appliance Laboratories, Institute for the Crippled and Disabled.

Fig. 1 — Hemipelvectomy prosthesis with large leather bucket and abdominal belt — front and back view.

Fig. 2 — Hemipelvectomy prosthesis with molded plastic bucket and bridge extending to the other side.

Fig. 3 — Internal lateral view of the molded plastic bucket showing the bridge extending across the midline to the other side.

tient required approximately two to three weeks to complete the training.

Ten patients with hemipelvectomy were fitted with this type of prosthesis. Nine patients had been operated upon for malignancies and one patient had a congenital hemipelvectomy. Five patients were male; five were female. The longest followup has been two and one-half years. Among these ten patients, three learned, and continue to use the prosthesis all day. They found the plastic bucket was comfortable and they were able to carry on their daily activities. Two patients, both young adult males, were able to use the prosthesis all day, but they had to discontinue because of recurrence of the disease. One patient, a woman of 24, was able to use the prosthesis for 10 hours each day, but she complained of discomfort from the plastic bucket, especially when she was sitting down. One patient, a man of 48, was given a plastic bucket without the additional ischial rest; he complained of insecurity because, when he was standing or walking, the prosthesis had a tendency to give way laterally in spite of a strong abdominal belt and shoulder strap. He was able to use the prosthesis only a few hours each day, and crutches were used for additional support. Three female patients were unable to use the prosthesis at all. Among these three patients, the first, a woman of 68, complained of constant pain in the scar while she was wearing the prosthesis. A neuroma was removed later, but the patient retained her wheelchair existence, mainly because of her age. The second patient, a woman of 53, had trouble with control of her bladder. Each time she wore the prosthesis, she developed some urinary incontinence; she also found the plastic bucket uncomfortable, especially when she was sitting in a low chair or in a car. Therefore, she chose not to use the prosthesis. The third patient, a woman of 42 who had had rather extensive pelvic surgery, found the prosthesis to be uncomfortable and refused to use it. All three patients were inactive and leading sedentary lives.

Summary and Conclusions

Hemipelvectomy prostheses with plastic molded buckets were made for ten patients. Five patients were able to use the prosthesis fully. Two patients were able to use the prosthesis for a few hours each day; one complained of discomfort, and the other of insecurity. Three patients were unable to use the prosthesis because of discomfort and other complications, such as neuroma and urinary incontinence.

The advantage of this improved prosthesis was the elimination of the telescopic movements, more adequate support, relief of pressure in the groin and the perineum, and an additional sense of security. Some problems of comfort and utility still remain unsolved; for example: in toilet activities, the prosthesis has to be removed. Young and active male patients seem to accept the prosthesis well; however, female patients over middle age who lead a sedentary type of life do not do well with this type of prosthesis.

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36th Annual Session, American Congress of Physical Medicine and Rehabilitation, Philadelphia, Hotel Bellevue-Stratford, August 24-29, 1958.

The officers of the American Congress of Physical Medicine and Rehabilitation, the American Academy of Physical Medicine and Rehabilitation and the Editorial Board of the ARCHIVES extend to all members, readers, advertisers and friends, their very best wishes for a Merry Christmas and a Happy New Year.

JAMES BEAVER MENNELL, M.D.

(1880—1957)

Dr. James Beaver Mennell was born in London on January 31, 1880. After primary school, he attended college at Cambridge, England. Anxious to follow his father's footsteps, he entered St. Thomas' Hospital Medical School in 1904. Following graduation in 1910, he proceeded to secure still higher qualifications and the M.D. degree. The latter scholarly achievement is highly considered in the United Kingdom.

For the next quarter of a century, he worked without interruption at St. Thomas' Hospital. Beginning first as casualty assistant and house surgeon, he went on to create the first Department of Physical Medicine. Here he remained in charge until his retirement in 1955. He was made a Life Governor of that Hospital.

During his lifetime, he had the honor of being elected president of the Section on Physical Medicine of the Royal Society of Medicine and the 1936 International Congress of Physical Medicine. In 1939 his Colleagues in the American Congress of Physical Medicine and Rehabilitation (then American Congress of Physical Therapy) bestowed upon him its highest honor — the gold key award. Other honors followed. In 1945 he was given honorary membership in the Netherlands Society of Physical Therapy; in 1947 the American Physical Therapy Association also honored him. Later in 1947 and in 1948, due to his fame and teachings, he was appointed visiting Associate Professor of Physical Medicine at the University of Southern California. Here he made many friends and some of our members had the privilege of his acquaintance.

Some of his most important publications were: Treatment of Fractures of Mobilization and Massage (1911); Backache (1935); Physical Treatment of Movement, Manipulation, and Massage (1945); Science and Art of Joint of Manipulation — in two volumes (1940-1952).

The personal side of great men is always of interest. He was a serious and methodical teacher of manipulative methods. He possessed a deep understanding of physical medicine and rehabilitation as it is understood today. He was an excellent speaker, accomplished writer, and an entertaining teacher. His wit was ever ready and always expressed in a quiet charming manner. He presented a distinguished appearance which inspired confidence in his patients and to his pupils. He will be remembered not only by his qualities as a fine physiatrist, but also because he was sincere and considerate to all whom he met. The writings he has left us, bear out his personal beliefs, which are essentially sound and honest. His example of life provides a challenge and inspiration to all physiatrists to continue a mission and heritage in developing further the principles and concepts of Physical Medicine and Rehabilitation.

Besides his son, Dr. John McM. Mennell, a member of the American Congress of Physical Medicine and Rehabilitation, he is survived by his widow, the former Elizabeth Walton Allen of St. Louis, and two other sons, James and Peter Mennell.

Herbert Kent, M.D.

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The letters used to explain in which department the matter indexed appears are as follows: "ab," abstracts, and the asterisk (*) indicates an original article in the ARCHIVES.

This is a subject index and one should, therefore, look for the subject word, with the following exceptions: "Book Reviews" and "Deaths," are indexed under these titles at the end of the letters "B" and "D." The name of the author, in brackets, follows the subject entry. If there are more than two authors, only the name of the first author is given.

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ABSTRACTS

The following abstracted articles have been published in the January-December, 1957 issues of the journal.

JANUARY

The sixth John Stanley Coulter memorial lecture: some problems of communication in medicine as illustrated by the Coulter bibliography. F. T. Jung. Some of Dr. Coulter's earlier publications are discussed. The problem of communication between students and associates, physicians and manufacturers of diagnostic or therapeutic apparatus is presented. The necessity for abstract sections in specialty journals is emphasized and the merits of Interlingua are mentioned. *(pp. 11-17)*

Overwork. G. C. Knowlton, and R. L. Bennett. Overwork, as used in this paper, means a long-lasting reduction of muscle strength resulting from previous activity. Clinical and experimental experiences are cited which indicate that psychologic and even physiologic fatigue can be unreliable indicators for limitation of exercise. Ordinarily, the point of psychologic fatigue is reached before physiologic fatigue occurs and physiologic fatigue does not necessarily represent overwork; however, in certain individuals overwork levels can be reached before either psychologic or physiologic fatigue is encountered. The relation of this to therapeutic exercise and education for self-discipline is discussed. *(pp. 18-20)*

Comparison of effects of electric stimulation with effects of intermittent compression on the work output and endurance of denervated muscle. K. G. Wakim, and F. H. Krusen. A comparison of the effects of electric stimulation with the effects of intermittent mechanical compression applied to denervated muscle for 15 minutes every half hour throughout the 8-hour day revealed that electric stimulation improved the work output and endurance of experimentally denervated muscle, while intermittent mechanical compression did not. The beneficial effects of electric stimulation may be attributable to factors other than simple compression and decompression induced by the contraction and relaxation resulting from electric stimulation. *(pp. 21-23)*

Flexibility characteristics of four specialized skill groups of college athletes. J. R. Leighton. These findings are presented as strong evidence that the number and kind of specialized flexibility performance abilities vary significantly among the different specialized skills studied, and that these variations do not occur for all movements nor for the same movements among the different special skill groups. *(pp. 24-28)*

An evaluation of some electrodiagnostic methods: III. electromyography. R. W. Boyle, and P. A. Dudenhoefer. A brief resume of the historical aspects of electromyography and early clinical research is given. The various types of apparatus used are briefly described. The physiologic basis for electromyography is discussed including nerve-muscle impulse propagation, the motor unit, the all or none theory, and the production of electrical changes with activity. The appearance of patterns from normal voluntary muscle is discussed, and comparison is made between these and the patterns formed in various neuromuscular disorders. The etiology and significance of fibrillations and fasciculations are discussed. *(pp. 29-36)*

Fifty years of food and drug administration protection with special relation to medical devices. I. Kerlan. The growth and changes in federal food and drug legislation since the passage of the Food and Drugs Act of 1906 are traced. The major developments of the Federal Food, Drug, and Cosmetic Act of 1938 are presented. The control of medical devices and the requirements relating to them are detailed. Legal prohibitions in the act and the ways in which the government enforces them are delineated. The physician plays an important role in relation to effective control activities in the device field. With regard to the future of the therapeutic device program suggestions are offered which will serve to promote safe and honestly labeled devices in the interest of the public health and welfare. *(pp. 37-40)*

Rehabilitation program in Pennsylvania: the Pennsylvania rehabilitation center. J. R. Torquato. Before Public Law 113 was enacted by Congress in 1943, rehabilitation service in Pennsylvania was inadequate. A record number of disabled were prepared for and placed in gainful employment during the calendar year 1955. Another all-time high of disabled individuals was referred to the Pennsylvania Bureau of Rehabilitation during the year and services have started for virtually all of them. Plans are under way now to double the staff in the Bureau of Rehabilitation so services can be provided to all disabled individuals within a minimum lapse of time, and a modern rehabilitation center is under construction. *(pp. 41-44)*

FEBRUARY

Study of cardiac output during rehabilitation activities. F. J. Kottke; J. N. Danz, and W. G. Kubicek. The cardiac demands of bed activities and light activities in occupational therapy were studied on normal subjects. The effect on cardiac output of semireclining at a 45 degree angle, sitting on the side of the bed, or sitting in a chair was found to vary only slightly from recumbency. Getting into and out of a bed increased cardiac output by 40 per cent. Chip carving while sitting on a straight chair increased cardiac output 15 per cent. Leather tooling while sitting in bed at a 45 degree angle increased cardiac output 24 per cent. Weaving on a floor loom while sitting on a chair increased cardiac output 77 per cent. Printing with a platen press while standing increased cardiac output 60 per cent. Body position and antigravity work are important components in determining the amount of work that the heart must do. The changes in metabolic work during activity may not correspond quantitatively with the changes of cardiac output. *(pp. 75-82)*

Muscle shortening produced by ultrasound. J. W. Gersten. Frog sartorius exposed to ultrasound, in vitro, shortened and developed small amounts of tension. This was not related to thermal changes or to radiation pressure effects per se. Glycerol and cocaine, a membrane stabilizer, prevented the shortening of striated muscle produced by ultrasound. It is postulated that the shortening is of the nature of a contracture, depending upon membrane changes produced by ultrasound. *(pp. 83-87)*

Upper extremity pylon: case report on a new device for facilitating crutch walking. J. L. Linden. A device to direct weight bearing to the healthy upper half of the forearm is described. *(pp. 88-89)*

Physiatry and the vocational rehabilitation program. J. Sokolow. Two important steps in the growth of physical medicine and rehabilitation are the programs developed during and after World War II and the amendments to the Vocational Rehabilitation Act in 1954. The resulting expanded program extends broad medical services to eligible persons in financial need. The new three part grant system administered by the Office of Vocational Rehabilitation is discussed and the ex-

pansion of services and extension and improvement of sheltered workshops and rehabilitation facilities are reviewed. Further, a training and teaching grant program was undertaken, which will greatly increase the number of physiatrists and stimulate awareness of the possibilities of the field on the part of other physicians. *(pp. 90-94)*

Rehabilitation's hidden dimension. W. C. Gorthy. With the development of more rehabilitation centers, need is increasing for management that will result in proper regard for the value of the professional person's time and effort, at the lowest possible cost. As services of the rehabilitation center become more comprehensive, management becomes much more complex and demands a unified and organized effort. Each profession in the center should employ the most modern technics, but the over-all management is a function that requires the application of executive skills. Key professional staff members participate in management through the development of policies that will govern the center's activities. Furthermore, when the over-all policies are adopted, with whatever limits are imposed, they have the added task of supervising their professional activities in accordance with these policies. This concept of center management has been developing at the Institute for the Crippled and Disabled and has aroused considerable interest. Specific principles and the results obtained are developed in detail. *(pp. 95-100)*

Use of the invalid lifter in the care of the severely disabled patient. E. F. Cicenia; M. Hoberman, and H. L. Dervitz. The use of the invalid lifter as a valuable adjunct to the care of the severely disabled patient who must be cared for in the home without the help of professional attendants or aides is described. The criteria for a suitable lifter is explained. The use of the lifter in transferring the patient to and from wheelchair, bed, toilet, and car is described along with an analysis of the methods that can be considered basic in the use of any lifter. *(pp. 101-108)*

Clinical note: applicator for mineral oil in ultrasonic therapy. I. C. Smith. The convenience of using a plastic container which needs no stopper is described. *(p. 108)*

MARCH

Emotional aspects of chronic physical disability. E. M. Litin. Few untoward emotional reactions are witnessed in patients during the acute phases of physical disabilities. When the immediate dangers are over and the early chronic phase is entered the emotional difficulties become apparent. They become so entwined with the physical disabilities that progress or regression in one sphere is reflected in the other. Each patient has his own psychologic vulnerabilities, which become manifest in the early chronic phase when a massive evaluation and reorganization must take place. During this period previous personality patterns become all important and to a large extent determine the degree of future emotional and physical rehabilitation. Some suggestions regarding the development and management of these psychiatric complications are presented. *(pp. 139-142)*

The psychiatrist and rehabilitation. J. C. Nemiah. An important recent development in rehabilitation is the growing awareness of the importance of emotional problems in patients and the beginning of collaboration between psychiatrist and physiatrist in studying them. Two major sources of emotional conflict are the way in which injury or illness threatens the integrity of the patient's body and the security of his relationships with others. Depending on how the patient handles these problems, a variety of reaction types may be seen clinically. Case histories are cited to illustrate these types, and treatment suggestions are made. The danger of permitting psychological reactions to become chronic and the factors conspiring to make them chronic are discussed. Since the longer a psychological reaction persists the more it tends to become irreversible, the importance of preventive measures early in rehabilitation is emphasized. *(pp. 143-147)*

The effect of ultrasonic energy on osteogenic sarcoma: an experimental study. J. M. Janes; D. C. Dahlin; J. F. Herrick, and G. M. Higgins. The destructive effect of ultrasonic energy on bone has been demonstrated repeatedly in the laboratory. Medullary fibrosis associated with cortical necrosis is the most frequent finding. Bones are more susceptible to fracture following exposure to this physical agent. An experimental study of the effect of ultrasonic energy on the epiphyseal

region of young dogs and rabbits led to the conclusion that it has a destructive effect on growing bone. Defects created surgically in the femora of dogs were exposed to ultrasonic energy in order to study its effect on the healing of bone. Stimulation of the healing of these defects was not seen. Although osteogenesis was produced by this physical agent, this type of osteogenesis was purposeless and without direction as far as repair of the defects was concerned. A definite delay in healing was observed. The well-established potential destructive force of ultrasonic energy on bone obviously suggests the investigation of using this energy for possible inhibition of the growth of bone tumors as well as possible destruction of the tumors themselves. Fortunately, a method for the production of osteogenic sarcomas in rabbits was available, and these sarcomas afforded an excellent test object for the desired study. Necrosis was produced in them by ultrasonic energy. The particular technic employed for administering this agent did not ensure a field of uniform intensity and consequently islands of viable tumor cells remained. Further work is planned whereby fields of uniform ultrasonic energy may be attained, thus making possible destruction of the entire tumor. *(pp. 148-156)*

Effect of brief maximal exercise on the strength of the quadriceps femoris. D. L. Rose; S. F. Radzyminski, and R. R. Beatty. This work is an attempt to confirm the studies of Hettinger and Mueller and to extend the procedure of brief maximal exercise into the clinical field. The method employed consisted of determining the maximal weight which the quadriceps femoris could carry through a full range of motion and sustain for five seconds, repeating this procedure daily with a single attempt to increase progressively the weight lifted. In 28 normals, an average increase in strength of 0.7 pound per day (to a plateau level) was observed. No significant measurable muscular hypertrophy was observed. In 32 adults with quadriceps weakness, marked variation in exercise response was observed; however, the response of some differed very little from the normal. Ten normal adults attained plateau strength by this method. The strength so attained persisted with exercise frequency as seldom as once monthly. The point at which strength is lost was not determined. *(pp. 157-164)*

New apparatus: active motion devices in physical medicine. R. Mazet, Jr., and H. J. Hogan. Several devices are described, namely, the respirator-type hand and wrist extensor, the Wadsworth extension and contraction finger exerciser, and the ski-type hip abduction-adduction exerciser. *(pp. 165-167)*

APRIL

Rehabilitation of the aphasic patient: a survey of three years' experience in a rehabilitation setting. M. Marks; M. Taylor, and H. A. Rusk. Two hundred and five aphasic patients who had been evaluated and/or treated at the Institute of Physical Medicine and Rehabilitation in the speech department comprise the basis for this study. Such factors as vocational status, education, handedness, physical disability, previous speech therapy, number of therapeutic sessions, length of therapy, time lapsed before coming to the Institute, rated degree of recovery, type of continued therapy, and cause of aphasia are data included in the statistical survey. *(pp. 219-226)*

Rehabilitation center concepts' change in practice. H. Redkey. The term rehabilitation center should be reserved for comprehensive facilities. A physical medicine department, sheltered workshop, or vocational training school is not a comprehensive center. Small out-patient treatment centers and hospitals often have difficulty planning for comprehensive centers. Adequate medical supervision and prevocational services are the most common difficulties. The breadth of meaning of the term rehabilitation is not clearly understood by many specialists involved in it. There is some inclination to divide into two main types of centers: the medical center and the vocational center. This trend could make integration of services to the patient much more difficult. Cross consultation between hospital and center and vocational agencies of various kinds will contribute enormously to good service to the rehabilitation patient. Continued change in rehabilitation center concepts is predicted. *(pp. 227-233)*

A platform crutch for the severely involved arthritic patient. M. G. Lepley, and F. J. Kottke. A platform-type crutch positioned and shaped to individual patient needs is described. *(pp. 234-235)*

A method for recording the progress of scoliosis and other trunk deformities with a review of previously suggested methods. R. L. May. A device for measuring and recording the progress of both the lateral and rotational component of the scoliosis curve is described. *(pp. 236-242)*

Respiratory rehabilitation in poliomyelitis. L. Lewis; G. G. Hirschberg, and J. P. Adamson. The result and rate of rehabilitation are greatly influenced by initial care in the treatment of respiratory paralysis. Prevention of hypoxia and coordinated medical and nursing care influence prognosis for survival and determine the rehabilitation potential: Accessories to the respirator help assure maximum preservation of function and diminish the frequency of complications. Careful management of the urinary tract, bowel, diet, fluid intake, and electrolyte balance are necessities of early care. Regulation of pulmonary ventilation avoids the dangers of hyperventilation alkalosis and in its sequelae. Skillful early care prepares the patient for an active rehabilitation program and eliminates long periods of mental depression with accompanying impairment of motivation. Withdrawal of respiratory aids is gauged according to rate of recovery of function. Acceptance of permanent needs for modified respiratory assistance requires careful psychological orientation of the patient. Determination of specific muscular disturbances and respiratory patterns makes it possible to specify types of abdominal and trunk supports, if needed, and provides a basis for assessing the needs for ventilation assistance in various body positions. Exercise activities must be correlated with respiratory capacity. The general rehabilitation program includes all the modalities of physical and occupational therapy together with the development of assistive devices that may range from simple feeding aids to complex electronic apparatus. *(pp. 243-249)*

Physical fitness index studies (PFI) in hospitalized diabetic patients. H. T. Zankel; E. Raymer; M. Ullman, and E. Chiorian. Diabetic patients were referred to the physical medicine and rehabilitation service for treatment. Routine physical fitness index (Rogers) studies were made of these patients at the beginning and end of treatment. Some patients were referred to the corrective therapy and manual arts therapy sections; others were referred to the manual arts therapy section alone. The object was to determine what effect, if any, an intensive exercise program has upon the physical fitness index of hospitalized diabetics. The results, as shown by improvement in their physical fitness index, indicate that they will benefit by such a program. *(pp. 250-254)*

MAY

Prevocational medical evaluation of young cerebral palsied adults. S-J. Yue, and R. C. Darling. This paper presents a prevocational evaluation of a group of young adults suffering from cerebral palsy. The evaluation was divided into two phases. The physical phase included evaluation of the ability of the patient in ambulation, self-care, and manual dexterity. The mental phase included psychometric studies and speech and psychiatric examinations. A system is proposed to classify each patient in one of five grades in physical performance and, similarly, according to psychological assets. This scheme of classification will later be correlated with their performances in vocational evaluation. *(pp. 283-289)*

Prognosis for respiratory recovery in severe poliomyelitis. J. E. Affeldt; A. G. Bower; C. W. Dail, and N. N. Arata. In order to determine the chances of survival of a patient with acute poliomyelitis and his chances of becoming free of the respirator, an analysis of 500 such patients has been made, with a 2-year minimum follow-up. Death occurred in 15 per cent, 73 per cent became free of all respiratory equipment, and 12 per cent required some form of respiratory equipment either full or part time. The peak incidence for removal from respiratory equipment occurred during the second and third months after onset. By the first six months, 83 per cent of those to become free had done so. Vital capacity determinations are correlated with the patient's course. The average vital capacity as per cent of predicted normal at the time of becoming free of respiratory equipment was 62 per cent with a range from 23 to 100 per cent. Of the patients who continued to need a respirator, the average vital capacity was 16 per cent with a range from one to 39 per cent. Forty-one per cent of the 2-year respirator group used their equipment at night only. *(pp. 290-295)*

External rotation of the tibia in flaccid paralysis. G. G. Hirschberg, and L. Lewis. The deformity of external rotation of the tibia has been described mainly in poliomyelitis, but it can be found in other forms of paralysis. It has been attributed by some to tightness of the iliotibial band. It is the purpose of this paper to show, through case studies, that gravity is the determining factor. Prevention of this deformity is always possible, but correction is difficult. The anatomical reasons for this and the roll of the cruciate ligaments are discussed. *(pp. 296-299)*

Capillary resistance in poliomyelitis patients with and without stress of certain physical modalities. H. N. Neu; M. S. Kramar, and W. Anthony. Capillary resistance, as measured by the negative pressure method, is of much wider significance than it was thought hitherto. It has been determined, in normal subjects, that capillary resistance is subject to hormonal influence and is an individual trait. Physical or psychic stress may cause this individual level to change temporarily. This change, termed capillary stress response, may set in promptly and last for a few hours or may occur later and last for several days. Capillary stress response reveals typical patterns such as increase, decrease, or biphasic reaction. Capillary resistance was also investigated in poliomyelitis patients. The following questions were analyzed: Does the pathologic condition of such patients influence individual capillary resistance level? Does it modify capillary stress response? Can any effect of the intensive rehabilitation program be shown on the capillary resistance? The effect of certain physical therapy procedures on the capillary resistance was also compared in these patients. *(pp. 300-306)*

Understanding in rehabilitation of the severely disabled. S. M. Reichel. Emotional stress, egocentric orientation, and depression are natural, although undesirable, parts of the symptom complex of the early phase of severe disability. The development of hypersensitivity and hyperreactivity is discussed. A limited number of attitudes of the severely disabled is mentioned as well as appropriate matching attitudes for the staff. Severely disabled patients respond best in a rehabilitation setting where they may receive treatment geared to their particular needs by a specially trained and oriented staff, among fellow patients who are also severely disabled. *(pp. 307-310)*

Prevocational evaluation criteria for the severely handicapped. W. M. Usdane. Prevocational evaluation criteria for the severely handicapped should be concerned with standards demanded for employment in competitive jobs. These jobs should be represented by work samples that test individual skill and endurance. Capacity for supervisory roles, ability to get along with fellow workers, work tolerance, attendance initiative, and other specific items can be assessed within the prevocational unit in the rehabilitation center or hospital. Norms for the work samples may be established with the help of an advisory committee that includes individuals thoroughly familiar with the nature of the job. The very nature of the limitations of the severely handicapped individual negates, however, the development of rigid criteria; there must still be an understanding of the total individual. *(pp. 311-314)*

Rehabilitation survey and demonstration of greater Kansas City: a research study being conducted by Community Studies, Inc., of Kansas City, Mo. E. B. Shires, and A. Wahl. The cost and benefits of a comprehensive program for a metropolitan area are being measured by marshalling into action the community's rehabilitation potential through the coordination of medical and paramedical facilities, as well as the health, social, and vocational services, and industry and business. The methods employed by this research study in the evaluation of patients by the various professional and semiprofessional specialties are described. In addition, the organization of the team approach by the four major categories of the rehabilitation process (medical, psychological, social, vocational) will be followed throughout the rehabilitation program. *(pp. 315-318)*

JUNE

Significance of the pharynx in rehabilitation of poliomyelitis disabilities in the cervical area. J. F. Bosma. The objective of motor rehabilitation in the cervical area is not mere alignment and normal relations of parts while at rest, but normal range of strength and motion requisite to swallow, control of respiration, and speech. The role of

cervical postural mechanisms in disability of the mouth, pharynx, and larynx is described. *(pp. 363-368)*

Changes in peripheral blood flow produced by short-wave diathermy. D. I. Abramson; A. J. Harris; P. Beaconsfield, and J. M. Schroeder. The effect of short wave diathermy on blood flow in the forearm was studied in human subjects, using the segment type of venous occlusion plethysmograph. At a bath temperature of 32 C. (under which conditions cutaneous vessels are capable of readily dilating or constricting), a significant increase in blood flow was consistently observed during diathermy and for the subsequent 40 to 60 minutes. At a bath temperature of 45 C. (under which conditions cutaneous vessels are maximally dilated), diathermy still elicited a definite increase in forearm blood flow, in many instances, of a greater magnitude than at a bath temperature of 32 C. It was concluded that diathermy augments muscle blood flow. Furthermore, when the limb is heated, the vasodilating effect of this procedure may be enhanced, a hypothesis that has clinical implications. *(pp. 369-376)*

Application of ultrasound to experimentally induced neuromas in dogs. D. Rubin; G. Magovern, and R. Kallenberger. Surgically induced neuromas in the sciatic nerve of two dogs were treated with ultrasound in an effort to determine whether gross and histopathological changes could be detected in such neuromas. The clinical effectiveness of ultrasound in relieving neuroma pain prompted this study. Gross comparison revealed larger proximal neuromas in the control extremity than in the treated extremity in the same animal. Study of sections of proximal and distal neuromas failed to reveal any histological differences between control and treated tissues. There was no evidence of thermal alteration in any of the soft tissues of the treated extremities. The explanation is advanced that relief of neuroma pain in patients treated with ultrasound is probably the result of an altered physiological state of the nerve tissue rather than an anatomical change in nerve structure. *(pp. 377-382)*

Vital capacity as an index of respiratory muscle function. C. W. Dail, and J. E. Affeldt. The deficiency of respiratory reserve, as expressed in per cent normal vital capacity, is the integration of several factors, which may include any of the following: strength, endurance and adaptation, limitation of lung movement, distribution pattern of muscle weakness, body position, and presence of heart or lung disease, as well as certain technical factors. Before vital capacity measurements can be used to advantage as guides in treatment and in the prognosis of expected functional return, insight into all of these factors is necessary. If this is not done, vital capacity figures may be misleading. *(pp. 383-391)*

Problem of home treatment in arthritis. L. B. Parker, and L. F. Bender. In order to evaluate the effectiveness of instruction in home-treatment programs a survey was conducted among 56 patients with rheumatoid arthritis and osteoarthritis who had previously been instructed in adequate home-treatment programs. At the time of the interview 5 patients had stopped their home-treatment because of improvement in their condition, 27 were still continuing adequate home-treatment programs, and 24 were not treating themselves adequately. Six of these 24 patients never started on their recommended home program; 8 stopped home-treatment between two and four months after their instruction. This was greater than the number stopping in any other comparable period of time; therefore, it appears that the home-treatment program for arthritis should be reviewed with the patient at least every two months. *(pp. 392-394)*

Conservative management of certain types of back injury: analysis of results. D. E. Ford, and E. M. Krusen, Jr. This is a study of approximately 500 cases of acute low back strain treated in the Baylor University Hospital Physical Medicine Department during the past five and one-half years. These cases have been subjected to statistical analysis of the relationship of duration of symptoms before treatment and the relationship of compensation for injury to the result obtained, the number of treatments given and the number of days of hospitalization. *(pp. 395-401)*

JULY

Effect of body position on respiratory muscle function. C. W. Dail, and J. E. Affeldt. When a patient with respiratory

muscle weakness is placed in an erect position, breathing may be facilitated or impaired. Such effects are important since successful rehabilitation usually requires the patient to be erect. When there is moderate diaphragm weakness associated with abdominal muscle paralysis, breathing in a supine position may be easy, but the erect body position causes the diaphragm to descend and thus become shortened and ineffective. In diaphragm paralysis associated with strong abdominal muscles, breathing is difficult when the patient is supine but becomes easy in the erect position, permitting quite heavy activities. The diaphragm drops passively during inspiration and is elevated by abdominal contraction during expiration. It is the aim of this paper to present a practical understanding of the underlying principles since this will facilitate the therapy of such conditions. *(pp. 427-434)*

Further studies on the treatment of lymphedema. G. K. Stillwell; J. W. B. Redford, and F. H. Krusen. A number of patients with lymphedema of the upper extremity following radical mastectomy were treated with the vasopneumatic apparatus, the time-honored procedures of elevation of the extremity with manual massage to reduce edema, and muscle setting exercises to increase lymphatic and venous flow. Elastic supporting bandaging was used continuously during the day. When the patient learned how to do the elevation, exercises, and bandaging, these were performed at home without assistance. The progress in the reduction of the edema has been followed by volumetric measurements of the limb by displacement of water. In most instances the program has been successful in producing a significant reduction in limb size and discomfort. Among the essential features contributing to success are believed to be the supporting bandaging and the fact that the patient is taught to carry on treatment independently. *(pp. 435-441)*

Clinical evaluation of speech deficiencies in cerebral palsy. E. J. Lorenze, and M. A. Sokoloff. An important aspect of the physiatrist's evaluation of the cerebral palsied child is the definitive enumeration of the speech and language deficiencies present. To assist the physician in determining what deficiencies may be present, the prognosis for improvement, and kinds of treatment involved, the authors have reviewed 181 cases of cerebral palsied children. Included in the study are descriptions of the kinds of speech difficulties encountered, statistical breakdowns as to the incidence of each type of difficulty, and the amount of progress that may be expected with each diagnostic classification. Individual case studies are presented to illustrate technics of diagnosis and the procedures of therapy recommended for each classification. *(pp. 442-449)*

New apparatus: a method for the measurement of minimal muscle force. W. Bierman. A measuring device possibly minimizing some of the present day variables is described. *(pp. 450-453)*

Horizontal "leg press" exercises. R. H. Nyquist; C. E. Willhite; R. Jahn, and J. P. Sheridan. The results of treatment of five patients with incomplete spinal cord injury are described. Progressive resistive exercises for the lower extremities were employed by a new method that combines the resistance of springs with the traveling platform of the McCarthy exercise table. *(pp. 454-455)*

AUGUST

Effect of laboratory studies on treatment of atherosclerosis. J. J. Haglin; T. O. Murphy, and D. A. Felder. This report is an objective attempt to evaluate the effect of lumbar sympathectomy upon the ischemic extremity, using the electroplethysmographic measure of digital blood flow in a constant temperature environment. The effect of generalized vasodilatation by whole body heat stimulus and that of intravenous tolazoline (Priscoline) was studied. The use of whole body vasodilatation, either heat-induced or due to chemical means, is contraindicated in the sympathectomized patient, as there is a distinct reduction of digital pulse volume under these circumstances. The use of whole body heat vasodilatation to predict the effect of surgical sympathectomy is valid as to trend but is not a quantitative measure. The probable effect of lumbar sympathectomy in the older age groups and in diabetic terminal arteritis is equivocal, and may be detrimental. *(pp. 491-497)*

Preparation of a coaxial electromyographic needle sterilizable by heat. J. W. Gersten. A technic is described for preparation

of a coaxial electromyographic needle that may be sterilized by dry heat at the 100 to 104 C. level. *(pp. 498-499)*

Foot control driving apparatus for patients having little or no function in the upper extremities. O. L. Huddleston; R. W. Moore; A. G. Garris; D. Kope, and C. Enns. A device constructed to suit the specific needs of poliomyelitis patients with severe paralysis of both upper extremities is described. *(pp. 500-504)*

Physical medicine and rehabilitation in the member-employee program. J. L. Rudd. The objectives of the physical medicine and rehabilitation service are not only to satisfy therapeutic needs from the very beginning, but also to inculcate a work-oriented philosophy in patients and therapists. The physical medicine and rehabilitation service personnel are in a strategic position to observe and recommend candidates for member-employee status. *(pp. 505-508)*

Employment outlook for physical therapists: a survey of salary and personnel policies. D. C. Augustin, and J. A. Ehmann. A tabulation of salary and personnel policies are listed in detailed table form. The survey covers the United States, Canada, Hawaii and the Commonwealth of Puerto Rico. *(pp. 509-520)*

SEPTEMBER

Measurements of peripheral blood flow under conditions of physiologic stress. C. J. Imig; H. Gaskill, Jr.; A. Bauer, and H. M. Hines. These studies are concerned with the effect of muscular activity on blood flow through the extremities of normal persons and patients with peripheral vascular disorders. Volume blood flow was measured by venous occlusion plethysmography before and for some time after measured amounts of exercise. The resting blood flow in patients with severe peripheral vascular disease was similar to that measured in normal subjects; however, after exercise, the blood flow through the extremities of these patients was severely deficient when compared with the normal hyperemic response. These findings suggest that the blood flow response to stress might be a better measurement than rest blood flow determinations for evaluating the status of the peripheral vascular bed. *(pp. 571-573)*

Gradients of functional ability of importance in rehabilitation of patients with progressive muscular and neuromuscular disease. C. A. Swinyard; G. G. Deaver, and L. Greenspan. Eight stages of functional disability are described. These gradients of progressive disability encompass criteria essential to proper ambulation pattern, method of ambulation, and efficiency in performance of activities of daily living. Graphic expression of progressive disability in muscular dystrophy and atrophy in functional terms enables visualization of the natural history of the disease and anticipation of problems of importance in rehabilitation. These data also emphasize the necessity of clearly segregating the clinical types of progressive muscular dystrophy when embarking upon an objective evaluation of the technics of rehabilitation. *(pp. 574-579)*

Flexibility characteristics of three specialized skill groups of champion athletes. J. R. Leighton. Evidence that significant differences exist between the means of characteristics of specialization in flexibility performance ability among skilled performers specializing in different activities is presented. This data supports previous findings that the number and kind of specialized flexibility performance abilities vary significantly among the different specialized skill groups, and that these variations do not occur for all movements nor for the same movements among the different special skill groups. *(pp. 580-583)*

Muscular strength-endurance relationships. H. H. Clarke. Eight muscular strength-endurance relationships are discussed. The report is confined to the study of isometric muscular endurance. *(pp. 584-586)*

Trends in medical education. J. E. Rhoads. Medical education is far from static. New subject matter developed by current research makes the best medical education out of date in a decade or so. Strong trends toward specialization of faculty members are somewhat in conflict with the need for teaching students an integrated body of medical knowledge. Many expedients are being tried to overcome this difficulty. *(pp. 587-591)*

New apparatus: a device for measuring rotation of the neck. M. W. Cheshire. A semicircular clear plastic piece with a cut-out for the neck for measuring degrees of neck rotation is described. *(p. 592)*

OCTOBER

Concept of motivation in physical medicine. F. C. Shontz. Motivation is not a single, unitary trait in any patient's behavior or personality. It is best described as a patterning of factors, five of which are presented as necessary, though possibly not sufficient, to account for a patient's motivational condition. When motivation is properly analyzed and defined, and when statements in each of the five areas suggested can be made with reasonable accuracy for any specific patient, the field of rehabilitation will find itself in a position to make significantly improved predictions of ultimate rehabilitation success. *(pp. 635-639)*

Contractures in chronic neurologic disease. M. Lowenthal, and J. S. Tobis. The development of contractures is an ever-present danger in lesions of the upper and lower motor neurons. A review of the literature of the past 60 to 70 years indicates a significant variation in opinion as to etiology, prophylaxis, and treatment of contractures. Special attention is given to the role of muscle proprioception in the development of contractures and also to the influence of personality factors. *(pp. 640-645)*

Rapid measurement of the tension of carbon dioxide in blood. R. W. Stow; R. F. Baer, and B. F. Randall. Compared with an analysis time of one-half to one hour, the present method is capable of giving results in ten minutes. This is a modest improvement in the speed of analysis, in some situations this saving would be of value. The accuracy of the results obtained with the pCO_2 meter rival those obtained under the best conditions with either of the chemical methods. Two of the drawbacks in applying this method which are to be considered are that the method requires specialized equipment not now in general use, and the technic is not familiar to medical laboratory personnel and would require new training and practice. *(pp. 646-650)*

Child care testing in functional training. E. F. Cicenia; G. R. Stephenson, and C. F. Springer. The responsibility of child care is a crucial problem for the disabled mother after discharge from hospital or rehabilitation center. A test has been described that offers a means of evaluating the patient's skill and physical ability to carry out this task. The test provides for evaluation in two areas, management of nursery equipment and personal care of the child. Performance can be tested with the patient in either the sitting or standing position in accordance with the patient's residual ability. A method of grading is explained which takes into account the patient's proficiency of performance, independence and safety, and time. The results of the test can be used as a basis for a teaching program in necessary child care skills based on individual needs. *(pp. 651-655)*

Clinical note: shoulder support for the hemiplegic upper extremity. W. Murray. A shoulder sling for the purpose of diverting arm weight from the shoulder capsule to the patient's suprascapular and supraclavicular region, thereby avoiding problems of neck pressure is described. *(pp. 656-657)*

NOVEMBER

Pneumatic pulsatile mobilization: a possible method of motor rehabilitation in the pharynx area. J. F. Bosma. In attempted therapeutic substitutions for the physiological variations in intraluminal pressures within the poliomyelitis-paralyzed mouth, pharynx, and larynx, an apparatus has been devised which provides periodically varied pneumatic volumes and pressures, applied to this area through an oral and oral-nasal mask. The patient contains or modulates the pulsing column of air to cause successive inflation and deflation of mouth alone, of mouth and pharynx, or of the entire respiratory tract. *(pp. 679-681)*

Physiology of skeletal muscular circulation: a review. G. K. Stillwell. The regulation of the circulation of blood to skeletal muscle is based upon three mechanisms: (1) the phenomenon of "active vasomotion," which is regulated both by local metabolites and by the sympathetic nervous system; (2) the sympathetic nervous system, which supplies the vessels to the muscles with both constrictor and dilator fibers; there are also sympathetic constrictor fibers supplying the veins; and (3) humoral control by the adrenal medullary catechols. Norepinephrine is believed to be the chemical mediator liberated by the sympathetic nerve endings. Epinephrine is believed to act primarily by stimulation of carbohydrate metabolism as a result of which the level of blood lactate is increased. The lactate may be the ultimate vasodilator. *(pp. 682-688)*

Electromyography in disc disease. F. J. Bonner, and W. H. Schmidt. A brief description of localization and measurement of nerve root compression by the electromyograph is presented. Thirty cases were selected at random from many which had electromyography and spinal surgery. In 24 of these cases the electromyograph described the exact and total localization of the pathologic condition. The advantages of electromyography in suspected surgical root involvement and the accuracy of this examination when correlated with the clinical picture have been demonstrated. *(pp. 689-691)*

Communication problems in medicine. H. Lillywhite. In the field of medicine, possibilities of misunderstanding are multiplied manyfold by the nature of the vocabularies that must be used, the kind of information that must be divulged, and, in many instances, the stress under which the individuals try to communicate. Suggestions are presented as a possible aid in gaining the necessary understandings. *(pp. 692-696)*

Balanced foot-weight for quadriceps exercises. B. C. Wiley. A new balanced foot-weight that does not strain the lower leg has been developed for quadriceps exercises. The use of this balanced foot-weight has permitted more rapid increases in resistance during heavy-resistance quadriceps exercises, with resultant faster increase in strength and range of motion of knee extension. *(p. 696)*

DECEMBER

Total rehabilitation — the physiatrist's responsibility. A.B.C. Knudson. The physiatrist's formula for rehabilitation of the disabled stands out as a great monitor of medical progress, human engineering and international understanding in a world of increasing tensions. To attain the objective of the most complete and effective rehabilitation management of the patient, all must be aggressively rehabilitation minded. *(pp. 763-770)*

The seventh John Stanley Coulter memorial lecture: physical measures in the postoperative care of the surgical patient. F. B. Moor. Prolonged bed rest has certain deleterious effects, the most dangerous of which are venous thrombosis and pulmonary embolism. Early ambulation executed according to Leithouser's technic is almost a complete preventative of thrombosis and embolism, but early ambulation as currently practiced is not entirely effective. Immediate mobilization of the postsurgical patient by means of electrical stimulation of the calf muscles followed by bed exercises and then by ambulation on the first postoperative day is less strenuous for the patient than immediate ambulation and is effective in preventing thrombosis and embolism. In a controlled series of 100 major postoperative surgical cases in which sinusoidal stimulation of the calf muscles was followed by bed exercises and early ambulation, there were no instances of thrombosis or embolism. *(pp. 771-775)*

Disturbance of perception of verticality in patients with hemiplegia: second report. J. H. Bruell; M. Peszczynski, and D. Volk. Twenty hemiplegic patients were tested on a space perceptual task administered in a dark-room and which involved the perception of verticality. Nine of the patients performed like normal control subjects. The remaining eleven patients showed signs of spatial disorientation. Performance on the space perceptual task was found to be related to ambulation. In general, patients who walked well were not disoriented in the dark-room, while all wheelchair patients tested in this study were disoriented. *(pp. 776-780)*

An improved prosthesis for hemipelvectomy. S-J. Yue, and C. R. Goldstine. Hemipelvectomy prostheses with plastic molded buckets were made for ten patients. Five patients were able to use the prosthesis fully. Two patients were able to use the prosthesis for a few hours each day; one complained of discomfort, and the other, of insecurity. Three patients were unable to use the prosthesis because of discomfort and other complications, such as neuroma and urinary incontinence. *(pp. 781-784)*

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Another Journal . . . ?

Dear Doctor:

In 1958 a new medical journal, ARTHRITIS & RHEUMATISM, begins publication under the sponsorship of the American Rheumatism Association. Clinicians and investigators now overwhelmed by the large number of journals in existence may rightly ask, "Why start another?" The Association carefully considered all aspects of this question before making its decision. Because of the increasing interest in the rheumatic and connective tissue diseases and the rapidity with which new knowledge is accumulating, such a journal was considered highly desirable and, in fact, inevitable.

The new publication will concern itself with rheumatoid arthritis, rheumatic fever, osteoarthritis, gout, nonarticular rheumatism, and the broad field of connective tissue diseases. In our choice of original and review articles we will attempt to achieve an optimal balance between reports of clinical experience and pertinent advances offered by basic science disciplines such as pathology, immunology, biochemistry, and pharmacology. In addition to reports of original work, progress reports, and review articles, we plan to include editorials, news and notices, book reviews and correspondence. The following articles are a few of those scheduled for early issues, and indicate the quality we hope to maintain:

"Evaluation of Hormonal Therapy in Rheumatic Fever"—J. Robles Gil

"The Problem of Therapeutic Evaluation in Rheumatoid Arthritis"—S. L. Wallace and Charles Ragan

"Rheumatoid Arthritis in Children"—Gunnar Edstrom

"Experience with Triamcinolone in Treatment of Rheumatoid Arthritis"—Richard H. Freyberg et al.

If our endeavors are successful, we will have a periodical which is of interest not only to our own members, but also one which will be valuable to all physicians who desire to keep themselves abreast of progress in this important field of medicine.

Sincerely yours,

William S. Clark

William S. Clark, M.D., Editor

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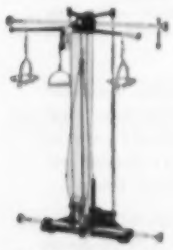

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1. Any subject of interest or pertaining to the field of physical medicine and rehabilitation may be submitted.

2. Manuscripts **must be** in the office of the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, not later than June 2, 1958.

3. Contributions will be accepted from interns, residents, graduate students in the pre-clinical sciences, and graduate students in physical medicine and rehabilitation.

4. The essay must not have been published previously.

5. The American Congress of Physical Medicine and Rehabilitation shall have the exclusive right to publish the winning essay in its official journal, the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.

6. Manuscripts must not exceed 3000 words (exclusive of headings, references, legends for cuts, tables, etc.), and the number of words should be stated on the title page. An original and one carbon copy of the manuscript must be submitted.

7. The winner shall receive a cash award of $200.

8. The winners shall be determined by the Essay Award Committee composed of four members of the American Congress of Physical Medicine and Rehabilitation.

9. All manuscripts will be returned as soon as possible after the name of the winner is announced.

10. The American Congress of Physical Medicine and Rehabilitation reserves the right to make no award if, in the judgment of the Essay Award Committee, no contribution is acceptable. Announcement of the winner will be made at the annual meeting.